

THE ISLAMIC GOLDEN AGE

<https://doi.org/10.5281/zenodo.7512751>



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Foundation of Advanced Research Publisher's

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Abstract: This article discusses some key individuals who contributed to the rise of Islam's "Golden Age". This is a period of development of Islam that spans about five centuries, beginning with the reign of the Abbasid caliph Harun al-Rashid (c. 786-809). Although it ended with the fall of the Abbasid caliphate after the Mongol invasion and sack of Baghdad in 1258, some scholars extend the period of the Islamic Golden Age to cover a longer period. But during the Golden Age, a truly remarkable period in human history, the arts and humanities, the natural and social sciences, medicine, astronomy, mathematics, finance, centuries of Islamic and European monetary systems thrived. In addition, this article presents some examples of the continuing contributions of the Islamic Golden Age from antiquity to the present day.

Keywords: Islamic civilization; Islamic Golden Age; Islamic Dynasties; Islamic Sciences; Islamic Philosophy; Islamic History.

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Received: 05-01-2023

Accepted: 07-01-2023

Published: 22-01-2023

Introduction

The achievements of Islam during the Golden Age (approximately 786–1258), which lasted nearly five centuries, brought great pride to Muslims around the world. Even today, many scholars believe Islam is waiting for a resurgence of the Golden Age and hope to see it resurrected as one of the world's cultural and religious influences. One such expected result is the development of a common ideology that transcends linguistic, cultural, and even ethnic differences and divides Muslims into various, often competing, ethnic and national camps. Whether the Islamic world will have this opportunity in the near future remains to be seen, but it certainly depends on the capabilities of countries, especially in the North Africa and West Asia (MENA) region and end of the political and military tensions that undermine decades of peaceful development.

Many cultures and societies contributed to the prosperity of the Islamic Golden Age. Among them, the current leaders of Iran, the Persians, occupied a central position. The Persians were the driving force behind the founding and Golden Age of the Abbasids (750–1258), one of the most civilized societies of their time. Like the modern Abbasid dynasty, the Fatimids (AD 909–1171), the non-Arab Heberls of North Africa played a key role in the emergence of the Golden Age. In addition, during this period, Central Asian Muslim scientists discovered various modern inventions, laid the foundations of many sciences that are still important today, and contributed to their further development. The Andalusian dynasty (711–1492 AD)

of the Iberian Peninsula (Spain and Portugal) also played an important role in the emergence of the Golden Age. In fact, the architectural achievements of the Andalusian dynasty are among the most remarkable, enduring, and internationally recognized contributions to Islam. During this period, Islam entered the world, developed its culture, enriched daily life, spread throughout the world, and made progress in all aspects. This article, will focus on the scientists and their inventions that helped build this "Islamic golden age."

Language and Education

Arabic is the language of the Quran and the religious language of all Muslims, but the majority of Muslims cannot understand or write Arabic. Semitic language and lexicographyes such as Phoenician, Aramaic, Hebrew, and Ugaritic also exist, but Arabic is the only extant language of the ancient North Arabic dialect group, as evidenced by pre-Islamic Arabic inscriptions from the 4th century. Arabic is written using the Arabic alphabet, Abujad's script, and is written from right to left. With the spread of Islam, Arabic became an important language for scholarship and religious devotion. From the last centuries of the first millennium AD, the language became a tool for the study of science, especially medicine, optics, astronomy, astrology, alchemy (the predecessor to chemistry), geography, botany, mathematics, philosophy, history, ethics, literature, especially wisdom literature, music theory, jurisprudence, Islamic theology, Arabic grammar, poetry and Lexicography. The issue of education has been at the forefront of Muslim minds since the founding of the state of Medina in its early days. Arabic teaching, which has always been a field of great pride for Muslims and in which successive rulers established great libraries and learning centers, which have now become commonplaces. The first educational institutions in Islamic societies were built near or within mosques to serve as gathering places where people could gather around scholars. Some Islamic schools continue this tradition of informal education. However, as time passed, Muslims began to build formal buildings. Institutions that specialized in education, had dormitories for students and teachers. The curriculum usually began with reading and writing exercises in Arabic and with the recitation of the Koran. Grammar, Islamic Law, Mathematics, and History were part of the course. This is how most of the locals were brought up since childhood. Numerous universities were subsequently founded throughout the Islamic world by wealthy men and women through caliphs, sultans, and personal endeavors.

Science

Science was born and developed in the same context as philosophy but did not face the same opposition. Several verses of the Quran already urge Muslims to seek

science and knowledge. Initiated by the last ruler of the Umayyad dynasty and carried on over the following centuries by the Abbasid dynasty, the scientific movement spread throughout the Islamic lands. Muslims have amassed a considerable legacy in countries where Islam was adopted. They not only translated these works but also enriched and expanded them with new discoveries. Massignon & Arnaldez explained: "The Arabs did better than transmit science, they awakened the taste, and they begun to confront the Greek concepts with experience..." they took on a large project. Based on the activity of critics and observations, we can see a tremendous awakening of scientific reason everywhere we look (quoted in Burlot 1982: 10). In the field of mathematics and astronomy, during the 9th and 10th centuries, Greek scientists such as Euclid, Archimedes, and Apollonius were influenced by Indian sources such as Aryabhata. Such intellectual encounters resulted in significant developments such as the decimal place-value system, the first systematized study of algebra (named after the work of scholar al-Khawarizmi, a scholar of Baghdad's House of Wisdom), and many other advances in the study of geometry and trigonometry (Van Sertima 1992:394). In 770, the Abbasids adopted the decimal system and created "Arab" numbers. They used the number zero (sifr: empty), which enormously facilitated operations in comparison to the Roman numerals. The word "algorithm" comes from the great mathematician Al-Khwarizmi (780–846 CE), who was born in Kharazm, Uzbekistan, and published in Baghdad in 825 CE for his famous treaty on Indian calculation known by its Latin name, "Algorithmide numero Indorum". He then published his famous book *Kitab al Jabr*, which made him the "Father of Algebra" by giving solutions to quadratic equations. These findings had direct practical applications. Al Khwarizmi himself said: "In practice, these concepts are required in work aimed at assessing surfaces, raising river flows, drawing up building floor plans, and other practical methods of all kinds and disciplines."

The mathematician Abul Wafa Bujani (940 AD–998 AD) move to Baghdad and made important innovations in spherical trigonometry, and his work on arithmetic for businessmen contained the first examples of the use of negative numbers. He is also known for editing his table of signs and his table of tangents and introducing the "sec" and "co-sec" functions. He also studied the relationships of six trigonometric functions connected by arcs. His *Almagest* was widely read by medieval Arab astronomers in the centuries after his death. Unfortunately, many of his works have not survived.

A great scientist, Sufi mystic, and theologian, the great poet Omar al-Khaiyam (1048 AD–1131 AD) published an influential treatise on the demonstration of

algebraic problems in 1070 AD. and laid down the principles of algebra. the part of Islamic mathematics that was eventually taken over by Europe (Allard 1997). In particular, he derived a general method for solving his cubic equations as well as several higher orders. In his paper, he wrote about the triangular arrangement of binomial coefficients, currently known as Pascal's triangle. In 1077 A.D., another major work was published by al-Khayyam named as "Sharh ma ashkala min musadar atkitab Uqlidis" meaning Description of the Difficulties of Euclid's Postulates.

Political leaders actively supported scientific efforts. For example, Caliph al-Mamun, a keen philosopher and scientist, built an observatory as part of his "House of Wisdom." Islamic astronomy later had a great influence on Byzantine, European, and Chinese astronomy . For example, Al Ferghani (d. 861 AD) was an astronomer from Damascus who calculated the Earth's longitude and wrote down astronomical elements. Al Battani (d. 930 AD) discovered the precession of the vernal equinox and the tilt of the ecliptic, and Abd-Rahman al-Sufi (903 AD-986 AD) wrote about 965 stars. The greatest astronomer, Ali ibn Yunus (950-1009 AD), worked in Cairo, where the Fatimid caliph al-Hachem built an observatory for him. In the 12th century, Nur al-Din al-Bitorji (d. 1204 AD) established the theory of planetary spiral motion, paving the way for modern astronomy. Trigonometry was initially considered a subfield of astronomy but was later established as an independent science. They borrowed sine and cosine from Native Americans but developed tangent and cotangent .

Medicine

Islamic medicine is one of the most famous and well-known aspects of Islamic civilization and one of the areas of science in which Muslims excelled most during the Golden Age. Their medicine and technology were part of medical school curricula around the world until about a century ago. Today, despite the rapid spread of Western medical education, Islamic medicine continues to be studied and practiced in its home country rather than being merely a matter of historical interest.

According to the Qur'an's global vision of a health system and the many hadiths advocating cleanliness and a good diet, scholars such as Ibn Qayim al-Jawziyah (1292-1350) and al-Asfahani (d. 1038) wrote "Prophetic Medicine." It is a kind of prevention derived from the Sunnah that protects body and soul. In addition, the Abbasid family had a particular interest in supporting medical research. Harun al-Rashid founded the first hospital in Baghdad under the guidance of several Christian scholars trained at his Gundaishapur Hospital, a 6th-century Persian research institution. By the end of the 9th century, several other hospitals in Cairo, Mecca, and Medina, as well as mobile medical units, were well established in rural

areas. These hospitals treated men and women, had outpatient facilities, and served the poor. Many hospitals had psychiatric wards, libraries, and classrooms. Cairo's Mansuria Hospital, built in the 13th century, still treats the blind. By the 14th century, many hospitals were also established in Muslim India. As in the Arab world, medical care was free and supported by Waqf foundations and government patronage.

Ophthalmology

Ophthalmology was then considered the most successful branch of medical research, and Ibn al-Haytham's work remained an authority in this field right up to the early modern period. Al-Razi (Rhazes, born in 865) was one of the greatest Islamic physicians. He wrote his Kitab al-Mansuri (Latin: Liber Almartoris) in ten volumes as a treatise on Greek medicine and also published works on smallpox and measles. The work of the ancient Greek and Roman physicians Hippocrates, Galen, and Dioscurides is well integrated into Islamic medicine. Al-Razi's texts have been reprinted all the way back to the 19th century. Ibn Sina (born in Uzbekistan, Central Asia) was also known in the West as the "Prince of Physicians." His compendium of Islamic medicine, the al-Qanun fi'l tibb (Code of Medicine), was the ultimate authority on medical issues in Europe for centuries. Although Ibn Sina made progress in pharmacology and clinical practice, perhaps his greatest contribution was to the philosophy of medicine. He combined physical and psychological factors, medications, and diet in treating patients to create a system of medicine now called holistic. Another example of his success was his description of the pulmonary circulation.

Ibn Al-Nafis, a 13th-century Arab physician, his Tasrif, written by the surgeon Al-Zahrawi (936–1016), was translated into Latin and became the leading medical text in European universities in the late Middle Ages. Al-Zahrawi was also a noted pathologist, describing hydrocephalus and other congenital disorders and developing new surgical techniques such as intestinal suturing.

Philosophy

One of the famous names is al-Farabi (870–950), and although he made considerable contributions to other areas of knowledge, his most important additions concerned philosophy, logic, and sociology, and the encyclopedia which served as a dictionary. For Berger (1983), al-Farabi was the first scholar to separate philosophy from theology in the Middle Ages. He believed in a supreme being who created the world through the exercise of a balanced intellect. He also contended that the same rational capacity is the only source of man's immortality, and thus established the development of this rational capacity as the highest human goal. He paid far more attention to political theory than Islamic philosophers. In a platonic way, he laid down the necessary qualities of a ruler as, those that tend to dominate

by virtue of their natural good character and must show the right attitude towards such dominance. Central to Al-Farabi's political philosophy is the concept of happiness, in which people work together to achieve happiness (Tiliouine 2014a). 9. Farabian epistemology has both Neoplatonic and Aristotelian aspects. The best source for Al-Farabi's taxonomy of knowledge is his *Kitab ihisa al-ulum*. This work embodies his esoteric and heretical beliefs. Running through them all is Aristotle's primary emphasis on the importance of knowledge. Al-Farabi was also involved in writing a book on early Islamic sociology and a prominent book on music titled *Kitab al-Mushiqqa* (The Book of Music).

History

History (*Tarikh*) is one of the most developed fields of Islamic civilization. It was more original in that it was less influenced by foreign science. First, it served as a mediator between religious studies and true history because it informed Muslims through the writings of people like Ibn Ishaq (d. 767 AD) and al-Wakidi (748–922 AD). A list of pensioners and new converts to Islam was then recorded for administrative purposes. For example, Al-Baladhuri (d. 892 AD) tells the history of Islamic expansion through land conquest. In addition, Kalbi Mohammed (d. 763) and his son Hisham (d. 819 AD) devoted themselves to the study of pre-Islamic Arabia and Islamic beginnings. They criticized *The Book of Kings*, which was a big hit at the time. Among them, the author, Ibn al-Mucaffa (d. 757 CE), has been accused of trying to revive the pre-Islamic culture of ancient Persia.

Muhammad ibn Jalil al-Tabari (AD 839–AD 922) was a master Muslim historian whose history took a step toward universalism. Tabari studied and traveled before settling in Baghdad to pursue his intellectual life. He was a polymath and is famous for writing one of the most important commentaries on the Qur'an and for compiling a huge universal history in 13 volumes. He tried to be as neutral as possible, collecting all knowledge and publishing it uncritically. He wrote his universal history so that each ethnic group investigated could find a more or less glorious past. Burlot (1982) argued that Tabari worked to achieve unity of ethnic groups in Islamic society, following Abbasid aspirations. Additionally, Rashid al-Din Hamadani (1247 AD–1318 AD) wrote his *Jami al-Tawarikh*, "The Collector of Chronicles," a truly universal history. It also included data on European popes and emperors, Mongolia, and China (which had spread from Spain to northern India during that time).

Geography

The expansion of the Islamic territories made traveling possible from the Atlantic to the Pacific oceans without having to cross any real frontiers. The annual pilgrimage to Mecca, the 5th pillar of Islamic faith, allowed thousands of ordinary Muslims as well as highly educated people to travel long distances and, in their

own unique ways, discover other places, cultures, and exchange ideas with people from nearly every part of the known world at the time. Such ease of travel contributed to the enrichment of Islamic geography beyond what was known to the Ancient Egyptians, Sassanids, Greeks, and Romans, or medieval Latin authors.

The most famous Muslim geographer was al-Idrisi, who added many details to the world's maps known at his time, such as the Tabula Rogeriana. Meanwhile, other geographers such as Yaqut al-Hamawi, Abu Rayhan Biruni (who was born in Uzbekistan, Central Asia), Ibn Battuta, and Ibn Khaldun provided detailed accounts of their journeys and the geography of the regions they visited. One of the earliest geniuses during the Abbassid Dynasty was al-Balkhi, who founded the "Balkhi School" of terrestrial mapping in Baghdad. Suhrab, a late 10th-century Muslim geographer, published a book of geographic coordinates with instructions for constructing a rectangular map of the world using the isosceles or equidistant cylindrical projection.

Muslim geographer Mahmud al-Kashgari (1005 AD–1102 AD) also created world maps based on language. During the same period, Abu Rayhan Biruni (born in Uzbekistan, 976 AD–1048 AD) first described the polar, square, and equidistant projections of the celestial sphere (David 1997:173). He combined astronomical measurements and mathematical formulas to develop a method of determining location by recording latitude and longitude. He also developed similar techniques for measuring mountain heights, valley depths, and horizon widths. His discussion continued, addressing issues of human geography and the planetary habitability of the Earth.

The Decline of the Islamic Golden Age

Numerous foreign invasions attacked the heart of Islam, resulting in the slow decline of an unprecedented multicultural and multiethnic civilization. For example, in the 11th century AD, Muhammad's Crusades in the 12th century put pressure on Islamic society, mainly through aggression. But a much greater threat arose from the east in the 13th century. In 1206 AD, Genghis Khan established a powerful dynasty among the Mongols in Central Asia. The Mongol Empire conquered much of Eurasia, including China in the east and many of the ancient Islamic caliphs in the west. The destruction of Baghdad and the House of Wisdom by Hulagu Khan, the Mongol leader, in 1258 CE has been seen by some historians as the end of the Islamic Golden Age. Later Mongol leaders completed that destructive mission in many other cities, slaughtered hundreds of thousands of people, and did irrevocable damage to the ancient irrigation systems of Mesopotamia and to major economic infrastructure. This, in turn, had a negative impact on the lives of the people of the entire region, gradually eroding many of the civilizational gains of previous periods.

Further to the west, the Catholics completed the Christian Reconquista in the Iberian Peninsula with a war against the Emirate of Granada that started in 1482 CE and ended with Granada's complete annexation in early 1492 CE, which also marked, for some historians, the end of the Islamic Golden Age.

There is little agreement on the precise causes of the decline, but in addition to invasions by the Mongols and crusaders and the destruction of libraries and madrasas, it has also been suggested that political mismanagement and the stifling of *ijtihad* (independent reasoning) in the 12th century CE in favor of institutionalized *taqleed* (imitation) led to that decline.

Al Hassan et al rejected the thesis that a lack of creative thinking was the main cause, arguing that science has always been cut off from religious debate. It analyzes the decline and draws on the works of 14th-century authors such as Ibn Khaldun al-Hassan extended the Golden Age to the 16th century AD, finding that scientific activity continued to thrive until then. Several other contemporary scholars have also extended it from the 14th to the 16th century AD, analyzing the decline in terms of political and economic factors.

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